INTERNATIONAL JOURNAL OF NATURAL AND APPLIED SCIENCES (IJNAS), VOL. 2, NO. 1(2007); P. 37 – 47, 10 TABLES.

Effect of genotype on growth and yield of sweet potato (*Ipomoea batatas)* (L.) Lam.) in Jos-Plateau, Nigeria.

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ABSTRACT

Two field experiments were conducted during the 2000 and 2001 cropping seasons at the Vom Garden of the Plateau Agricultural Development programme, Kuru, to study the morphological characters of fourteen genotypes of sweet potato, namely TIS. 8441, Ex-Igbariam, TIS. 86/0356, TIS. 86/0306, TIS.2271, TIS. 2532.OP.1.13, CIP 4400168, TIS. 2544 Rusanya 1.5, TIS. 82/0270.OP.1.85, TIS. 82/0070.OP.120, TIS. 8/637, NRCRI/UN/13, TIS. 87/0087 and a farmer's variety (Dan-Mangu), in relation to the tuberous root yield. The treatments were laid out in a randomized complete block design with four replications. Vine length, petiole length, number of branches/plant, vigour score, leaf area index (LAI) and leaf area duration (LAD) varied with genotypes in both years of experimentation. Crop growth rate (CGR), LAI and LAD were higher in high-yielding clones (e.g. TIS.86/0356, Ex-Igbariam, TIS.86/0306) than in the low-yielding ones (e.g. TIS 8441 and NRCRI/UN/13). Net assimilation rate was higher at the early stages of growth. Apart from vine length and NAR, all other morphological traits studied were positively, but non-significantly, correlated with total tuber yield.

INTRODUCTION

The term growth is applied to quantitative changes occurring during development and may be defined as an irreversible change in the size of a cell, organ or a whole organism. The external form of an organ is primarily the result of differential growth along certain axes (Cheema *et al*., 1991). Haynes *et al*. (1967) have demonstrated the relationship of crop growth rate (CGR), net assimilation rate (NAR), leaf area index (LAI), leaf area duration (LAD) as well as the distribution of assimilates to the total tuber yield in the sweet potato.

In sweet potato the leaves are the main source of assimilates for dry weight increase. The total dry weight of the crop depends on the size of the leaf area developed, the rate at which it is translocated to the roots and the length of time it persists. The leaf area index is proportional to the total leaf area produced. The optimum LAI of sweet potato is small due to mutual shading (Norman *et al.,* 1995). Watson (1952) noted that the dry matter production of different crops is proportional to the ability of the crop to maintain the leaf area throughout its life and the extent to which the dry matter production can be increased by increase in leaf area depends on the effect this has on the rate of assimilation per unit leaf area (net assimilation rate). The crop growth rate of sweet potato is relatively small compared with other C_3 plants due to low photosynthetic activity per unit area occasioned by mutual shading (Murata *et al*., 1976).

Just as an increase in LAI can give improved yields, so, theoretically, can an increase in NAR and hence CGR (Forbes and Watson, 1992). A high CGR, then, whether resulting from a high LAI, NAR or a combination of both, tends to lead to high yield, especially when it is maintained over a long period.

An understanding of the physiological relationships between morphological traits and tuberous root yield in sweet potato is important in understanding the critical features which influence the final tuberous root yields and the demand of certain genotypes by farmers. This forms the main objective of the present study.

MATERIALS AND METHODS

Two trials were conducted between June and December in 2000 and 2001 at the Vom Garden of the Plateau Agricultural Development Programme(P.A.D.P.), Kuru, in Jos-South Local Government Area of Plateau State (Lat. 09°44'N, Long. 08°47'E, altitude 1,239.4m asl.). The soil is ferrallitic cambisol developed from volcanic rocks (Enwezor *et al*., 1990). In both years the net plot size was 3x3 m², consisting of three 1m rows, each measuring 3 metres. In both years, the experiment was conducted between June and December. Planting was done on June 28 in 2000 and on July 10 in 2001 at inter-and intra-row spacings of 100 and 30cm, respectively, giving a population of 33,333 plants per hectare. The clones (TIS.8441, Ex-Igbariam, TIS.86/0356, TIS.86/0306, TIS.2271, TIS.2532.OP.1.13, CIP 4400168, TIS.2544 Rusanya 1.5, TIS.82/0270.OP.1.85, TIS.82/0070.OP.120, TIS.8/637, NCRCI/UN/13, TIS.87/0087 and the Farmers' variety (Dan-Mangu)) were randomly distributed to all the plots,

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using the randomized complete block design with four replications.

The plots were weeded and earthed up at regular intervals to keep them weed-free. At forty-five days after planting (45 DAP), the plots received a blanket application of 300g of NPK (15-15-15) fertilizer, equivalent of 50kg each of nitrogen, phosphorus and potassium per hectare. Due to circumstances beyond control, field observation and data collection started at 59 DAP in 2000 and at 77 DAP in 2001 and were continued weekly until 94 and 112 DAP in 2000 and 2001, respectively. One plant was sampled from each plot. The roots were thoroughly washed and the plants were separated into roots, stems and leaves. All plant parts were placed in separately labeled calico bags and dried in a moisture-extraction oven at 100^{o}C for 48 hours. Dry weights of leaves, stems, tubers as well as total dry weights were recorded.

Leaf area index (LAI) was calculated using the leaf disc method (Watson, 1947) as modified by Bremner and Taha (1966) and reported by Ifenkwe (1975). The method involves the determination of the total dry weight and of the area/weight relationship of a sub-sample taken from the mass of leaves with a punch of known diameter. Fifty (50) discs were taken from each sample and placed in envelopes for drying to constant weight in a moisture-extraction oven at 100^{o}C at 48 hours. The rest of the leaves along with the remains of the punched leaves were put into separate labeled calico bags and dried at the same temperature and time. Leaf area index was then calculated as:

$$LAI = \frac{\text{Area of disc x No of discs x Total Leaf dry weight}}{\text{Dry weight of discs}} / \text{Land Area occupied by sampled plant} \quad (1)$$

Leaf area duration was calculated by summing up the individual weekly LAI values for each clone (Watson, 1947). Net assimilation rate was calculated from the data obtained on dry weight of plants using the method of Watson (1947) as cited by Mannan *et al.* (1992):

$$NAR = \frac{w_2 - w_1}{t_2 - t_1} x \frac{Log_e L_2 - Log_e L_1}{L_2 - L_1} \quad (2)$$

where W_1 and W_2 are total dry weight of plant at times t_1 and t_2, (interval between t_1 and t_2 was 7 days), respectively; L_1 and L_2 are the leaf area at t_1 and t_2, Log_e is natural logarithm.

All the tubers harvested from each plot were weighed and the weight was extrapolated to the equivalent in tonnes per hectare. Data collected for the two years were analysed separately and then pooled together for clones that were used for both 2000 and 2001 experimentation. Treatment means were separated using the Duncan's New Multiple-Range Test (Steel and Torrie, 1980). Total tuber yield was correlated with vine length, petiole length, number of branches per plant, vigour score, LAI, LAD, CGR, NAR and harvest index.

RESULTS AND DISCUSSION.

Vine length and petiole length varied with genotypes in both 2000 and 2001. Vines and petioles were longer in 2000 than in 2001 (Table 1). Whereas clone TIS.82/0070.OP.120 had the longest vines in 2000, clone Ex-Igbariam produced the longest vines in 2001. Clone CIP 4400168 produced significantly longer petioles than the other clones in both years. Variations in vine length and petiole length might be due to the inherent genetic make-up of the varieties, which influences the morphological expression through the activities of endogenous gibberellin level (Leopold and Kriedman, 1975). Nawale and Salvi (1983) attributed excessive shoot growth to high rainfall, high humidity and less sunshine hours. The total annual rainfall at Kuru was 1,611.9mm in 2000 as compared to 1,171.8mm in 2001 (Table 2).

The non-significant positive correlation of tuber yield with petiole length corroborated the findings of Chandra and Tiwari (1987). Naskar *et* al. (1986) observed that petiole length was highly related to tuber yield in the sweet potato.

Mean number of branches per plant were generally higher in 2000 than in 2001 (Table 3). Clone TIS.2271 produced the highest number of branches per plant in both years; clone CIP 4400168 maintained the highest mean vigour score. Number of branches per plant and vigour score were positively correlated with tuber yield. Number of branches produced by a plant is primarily a genetic character and it is influenced by indole acetic acid in the plant as well as prevailing environmental conditions (Chandra and Tiwari, 1987). The positive relationship observed between vigour score and total yield indicates that plants that grow vigorously have a tendency to produce more assimilates to be made available for tuberous root development in sweet potato.

Results of the two-year study (Table 4a and b) indicate that LAI increased with time and that the peak period varied with genotype.

Effect of genotype on growth and yield of sweet potato

Clones that peaked earlier (e.g. NRCRI/UN/13, TIS.8441) were observed to yield less than those that peaked later (e.g. TIS.86/0356, CIP 4400168, TIS.87/0087). In clone TIS.86/0356, LAI increased throughout the sampling period and the clone ranked as one of the highest yielders in both years. This might explain why LAI and tuber yield were positively correlated in this study. Forbes and Watson (1992) had suggested that to increase yield in many crop plants, it might be necessary not only to increase LAI but to maintain the increased value throughout the growing period (i.e. to increase leaf area duration) (Table 5).

Table 6(a and b) show s the effect of genotype on crop growth rate in 2000 and 2001, respectively. Crop growth rate increased with time in all the clones and was higher in the high-yeilding (TIS.86/0356, Ex-Igbariam and TIS.86/0306) than in the low-yielding clones (NRCRI/UN/13 and TIS.8441). Forbes and Watson (1992) noted that a high CGR, whether resulting from a high LAI, a high NAR or a combination of both, tends to lead to high yields in most plants.

Net assimilation rate varied with genotype and time in both years (Table 7a and b). In most clones, NAR was high at the early stages of growth. In clones TIS.82/0270.OP.1.85, NRCI/UN/13 and TIS.2544 Rusanya 1.5 NAR increased throughout the sampling period in 2000. In the 2001 study, clone TIS.8441 maintained a consistently higher NAR than the other clones. Net assimilation rate was higher in the early than in the later stages of growth. As the cropping season progresses, photosynthesis no longer exceeds respiration in older leaves, due to mutual shading, so that dry matter production is reduced (Forbes and Watson, 1992).

Harvest index increased with time in all the clones in the two years of study, and the peak period varied with genotype (Table 8a and b). Clones that peaked earlier (e.g. Ex-Igbariam and TIS.8441) in 2000 appeared to be early-maturing, whereas late-maturing clones like TIS.86/0306, TIS.86/0356, TIS.2271, CIP 4400168, NRCRI/UN/13 and TIS.2544 Rusanya 1.5 peaked much later. The same trend was observed in 2001, when TIS.8441 and Ex-Igbariam peaked earlier than the rest of the clones. Harvest index was positively, albeit non-significantly, correlated with total tuber yield. The non-significant correlation observed in these studies might have been due to the keen competition between the shoot and the root for assimilates long after the commencement of tuberization. Under such circumstances, the shoot seems to have advantage over the root system (Wareing and Patrick, 1975). Harvest index has been used as an important criterion in the search for high-yielding genotypes (Johnson and Major, 1979).

The highest tuber yields were observed in clones TIS.86/0356 in 2000 and TIS.87/0087 in 2001. Clones NRCRI/UN/13 and TIS.2544 Rusanya 1.5 had the lowest yields of 7.2t/ha and 0.7t/ha for 2000 and 2001 trials, respectively. Tuber yields were generally higher in 2000 than in 2001 (Table 9). Sweet potato crops show a high degree of variability in both total and marketable tuber yields (Haynes and Wholey, 1971). Carpena *et al*. (1980) noted that yield in sweet potato is very sensitive to environmental changes. Nwokocha (1992) noted that if sweet potato was grown on the same soil continually or on a soil on which another tuber crop had been previously cultivated, yield would be reduced. This might explain the drastic reduction in yields between 2000 and 2001 since the same site was used for both trials.

The studies indicate that tuberous root yield of sweet potato is influenced by morphological traits and that selection for high yield may be based on those traits (e.g. petiole length, number of branches, vigour score, leaf area index, leaf area duration, CGR and harvest index) that are related to the final tuberous root yield.

Table 1. Mean vine and petiole lengths of selected sweet potato clones in 2000 and 2001

	Vine length (cm)			Petiole length (cm)		
Clone	**2000**	**2001**	**Pooled**	**2000**	**2001**	**Pooled**
TIS.8441	76.4^{de}	51.4^{e}	191.8^{b}	15.9^{cd}	5.0^{c}	31.2^{c}
Ex-Igbariam	120.3^{b}	137.9^{a}	387.4^{a}	16.3^{cd}	9.2^{b}	38.3^{bc}
TIS.86/0356	74.9^{de}	66.0^{de}	211.4^{b}	18.1^{bc}	12.5^{ab}	45.7^{bc}
TIS.86/0306	59.8^{e}	103.8^{bc}	245.5^{ab}	18.7^{bc}	10.4^{b}	43.8^{bc}
TIS.2271	74.9^{de}	76.0^{de}	226.6^{ab}	21.3^{b}	12.9^{ab}	51.3^{b}
TIS.2532.OP.1.13	103.0^{bc}	77.8^{de}	271.2^{ab}	16.5^{cd}	10.9^{b}	41.0^{bc}
CIP4400168	106.8^{bc}	88.0^{bcd}	292.2^{ab}	29.9^{a}	16.1^{a}	68.9^{a}
TIS.2544 Rusanya1.5	98.7^{bc}	81.1^{bcd}	166.5^{b}	16.5^{cd}	10.0^{b}	39.8^{bc}
TIS.82/0270.OP.1.85	95.2^{cd}	na	na	14.9^{cd}	na	na
TIS.82/0070.OP.120	154.2^{a}	na	na	15.2^{cd}	na	na
TIS.8/637	148.3^{a}	na	na	16.6^{cd}	na	na
NRCRI/UN/13	69.0^{e}	na	na	12.8^{d}	na	na
TIS.87/0087	na	73.3^{de}	na	na	11.4^{b}	na
Farmers' Variety	na	106.0^{b}	na	na	10.3^{b}	na

Means followed by the same letter(s) within the same column are not significantly different at 5% level of probability (Duncan's New Multiple-Range Test).
na = Not available

Table 2. Meteorological data for:
(a) 2000

			CLIMATIC FACTOR			
	RAINFALL[1]	RELATIVE[1]	TEMPERATURE(°C)[1]		SOLAR RADIATION[1]	SUNSHINE[2]
MONTH	(mm)	HUMIDITY(%)	MAXIMUM	MINIMUM	(J/cm²/day)	HOURS
JAN	0.0	20.48	27.76	12.15	17.86	7.6
FEB	0.0	14.24	27.61	13.07	17.31	5.4
MAR	5.9	25.73	30.10	16.83	18.79	5.8
APR	56.5	60.56	31.26	19.06	16.24	6.7
MAY	192.2	71.19	28.35	18.72	16.77	6.6
JUN	402.0	72.36	24.57	17.69	12.89	4.9
JUL	180.5	76.58	23.46	17.01	9.93	3.8
AUG	485.0	78.93	24.39	16.35	12.39	4.2
SEP	259.9	69.97	25.04	16.60	15.14	8.3
OCT	29.9	57.35	26.12	16.19	17.22	6.5
NOV	0.0	20.60	28.28	13.24	20.18	8.6
DEC	0.0	21.90	28.55	11.19	18.64	7.4
TOTAL	1611.9	589.89	325.49	188.10	193.36	75.8

(b) 2001

	CLIMATIC FACTOR					
MONTH	RAINFALL[1] (mm)	RELATIVE[1] HUMIDITY(%)	TEMPERATURE(°C)[1] MAXIMUM	TEMPERATURE(°C)[1] MINIMUM	SOLAR RADIATION[1] (J/cm²/day)	SUNSHINE[2] HOURS
JAN	0.0	15.23	28.05	9.91	19.79	8.1
FEB	0.0	12.46	28.85	13.18	19.52	7.2
MAR	0.0	14.58	31.93	17.33	20.82	7.2
APR	68.2	54.00	29.74	18.20	15.62	5.1
MAY	172.7	69.39	27.47	18.43	15.86	5.5
JUN	201.1	76.30	24.79	16.85	14.63	5.2
JUL	200.8	80.55	23.74	16.57	11.90	5.0
AUG	340.7	83.70	23.10	16.67	12.44	4.1
SEP	185.8	84.50	25.51	16.62	14.23	5.1
OCT	2.5	86.77	26.60	14.76	19.07	5.5
NOV	0.0	17.70	28.46	12.42	19.68	8.5
DEC	0.0	16.00	28.48	12.61	19.48	6.7
TOTAL	1171.8	611.18	326.72	183.55	203.04	73.2
MEAN	97.65	50.93	27.23	15.30	16.92	6.10

Source: [1] **Irish Potato Programme, Kuru, Plateau State**
(Lat. 09°44'N, Long. 08°47'E, Altitude 1,293.2m amsl)

[2] **Department of Geography and Planning, University of Jos, Jos, Nigeria**
(Lat. 09°57'N, Long. 08°53'E, altitude 1,159m amsl)

Table 3. Mean number of branches per plant and vigour scores of selected sweet potato clones in 2000 and 2001

	Mean No. of branches/plant			**Vigour Score**		
Clone	**2000**	**2001**	**Pooled**	**2000**	**2001**	**Pooled**
TIS.8441	$\mathbf{2.8^{ab}}$	$\mathbf{2.2^{a}}$	$\mathbf{7.5^{b}}$	$\mathbf{1.0^{e}}$	$\mathbf{1.3^{b}}$	3.5^{c}
Ex-Igbariam	2.3^{b}	2.2^{a}	6.8^{b}	1.3^{e}	2.7^{a}	6.0^{abc}
TIS.86/0356	2.7^{ab}	1.8^{a}	6.8^{b}	2.7^{ab}	2.7^{a}	8.0^{ab}
TIS.86/0306	3.0^{ab}	1.8^{a}	7.3^{b}	2.0^{cd}	1.7^{ab}	5.5^{abc}
TIS.2271	4.0^{a}	3.0^{a}	10.5^{a}	3.0^{a}	2.7^{a}	8.5^{abc}
TIS.2532.OP.1.13	1.8^{b}	2.3^{a}	6.3^{b}	1.3^{e}	1.7^{ab}	4.5^{bc}
CIP4400168	2.5^{ab}	2.0^{a}	6.8^{b}	3.0^{a}	2.7^{a}	8.5^{a}
TIS.2544 Rusanya1.5	2.5^{ab}	2.0^{a}	6.8^{b}	2.7^{ab}	1.7^{ab}	6.5^{abc}
TIS.82/0270.OP.1.85	2.2^{b}	na	na	2.0^{cd}	na	na
TIS.82/0070.OP.120	2.2^{b}	na	na	2.3^{bc}	na	na
TIS.8/637	2.8^{ab}	na	na	2.3^{bc}	na	na
NRCRI/UN/13	1.7^{b}	na	na	1.0^{e}	na	na
TIS.87/0087	na	2.5^{a}	na	na	2.3^{ab}	na
Farmers' Variety	na	2.2^{a}	na	na	2.7^{a}	na

Means followed by the same letter(s) within the same column are not significantly different at 5% level of probability (Duncan's New Multiple-Range Test).
na = Not available

Table 4: Leaf area index (lai) of selected sweet potato clones at various periods of growth in.
(a) 2000

	Days After Planting					
Genotype	**59**	**66**	**73**	**80**	**87**	**94**
TIS.8441	0.3	1.0	1.1	3.7	5.0	1.1
Ex-Igbariam	0.2	0.9	1.2	0.5	2.6	1.5
TIS.86/0356	0.4	1.0	2.8	2.4	3.4	3.8
TIS.82/0270.OP.1.85	0.3	0.9	0.4	2.6	0.4	1.8
TIS.86/0306	0.2	0.5	1.1	1.9	1.8	3.1
TIS.2271	0.6	0.6	2.0	3.1	1.6	2.7
TIS.2532.OP.1.13	0.4	0.4	1.4	1.4	2.0	1.2
CIP4400168	0.5	3.3	6.0	14.1	10.7	5.6
TIS.82/0070.OP.120	0.4	0.5	1.2	1.9	2.4	2.1
TIS.8/637	0.4	1.2	2.3	1.5	1.7	2.3
NRCRI/UN/13	0.3	0.5	2.2	2.0	0.4	3.4
TIS.2544 Rusanya 1.5	0.2	0.5	6.9	6.7	4.5	2.1
SE±	0.0	0.2	0.6	1.1	0.8	0.4

(b) 2001

	Days After Planting					
Genotype	**77**	**84**	**91**	**98**	**105**	**112**
TIS.8441	0.5	1.3	1.7	0.7	0.6	0.3
Ex-Igbariam	1.7	4.1	5.5	7.7	4.6	5.3
TIS.86/0356	1.3	3.5	7.1	3.3	3.3	2.4
TIS.86/0306	1.9	3.2	3.2	4.2	3.5	2.4
TIS.2271	1.9	3.4	4.4	3.3	3.9	2.1
TIS.2532. OP. 1.13	0.7	1.8	1.9	2.0	4.1	1.6
CIP4400168	1.4	2.9	5.0	5.3	3.7	3.1
TIS.2544 RUSANYA 1.5	0.8	2.0	2.4	3.9	1.1	2.5
TIS.87/0087	1.3	2.5	4.2	5.8	3.8	1.7
Farmer’s Variety	1.3	1.7	3.4	4.4	3.3	4.3
SE±	0.2	0.3	0.5	0.6	0.4	0.4

Table 5. Leaf area duration (lad) of selected sweet potato clones in 2000 and 2001

	leaf area duration (weeks)	
Genotype	**2000**	**2001**
TIS.8441	12.2	5.1
Ex-Igbariam	6.9	28.9
TIS.86/0356	13.8	20.9
TIS.86/0306	8.6	18.4
TIS.2271	10.6	19.0
TIS.2532. OP. 1.13	6.8	12.1
CIP4400168	40.2	21.4
TIS.2544 RUSANYA 1.5	20.9	12.7
TIS.82/0270. OP. 1.85	6.4	na
TIS.82/0070.OP. 120	8.5	na
TIS.8/637	9.4	na
NRCRI/UN/13	8.8	na
TIS.87/0087	na	19.3
Farmer's Variety	na	18.4
SE±	2.7	2.0

na = not available

Table 6. Crop growth rate (gm^{-2} $week^{-1}$) of selected sweet potato clones at various periods of growth in. (a)2000

	Days After Planting				
Genotype	**66**	**73**	**80**	**87**	**94**
TIS.8441	0.9	2.0	21.2	14.6	14.9
Ex-Igbariam	0.5	6.7	5.5	13.9	9.6
TIS.86/0356	3.8	2.4	11.6	15.5	5.8
TIS.82/0270.OP.1.85	3.1	4.2	8.2	11.9	12.0
TIS.86/0306	2.7	1.8	54.5	38.0	3.5
TIS.2271	1.4	2.2	12.7	1.8	2.8
TIS.2532.OP.1.13	3.7	0.0	2.3	10.4	9.3
CIP4400168	4.9	3.0	15.4	15.7	16.2
TIS.82/0070.OP.120	0.3	2.0	21.3	4.5	12.5
TIS.8/637	12.1	5.2	10.6	3.3	8.0
NRCRI/UN/13	2.3	4.3	3.7	7.0	23.9
TIS.2544 Rusanya 1.5	4.9	12.5	11.1	7.9	18.3
SE±	0.9	0.9	4.0	2.7	1.8

(b) 2001

Genotype	Days After Planting 84	91	98	105	112
TIS.8441	0.9	1.5	9.2	7.2	5.5
Ex-Igbariam	9.5	11.0	14.1	14.5	10.9
TIS. 86/0356	7.0	22.7	18.2	9.3	2.4
TIS. 86/0306	0.2	4.4	13.7	8.8	4.3
TIS. 2271	4.2	9.0	5.8	7.2	5.9
TIS. 2532. OP. 1.13	2.5	3.3	4.8	12.0	8.3
CIP4400168	3.3	1.2	11.6	3.4	2.5
TIS. 2544 RUSANYA 1.5	2.6	5.9	11.2	8.6	3.4
TIS. 87/0087	0.4	1.5	19.7	14.7	1.5
Farmer's Variety	5.0	3.2	6.4	7.9	15.6
SE±	0.9	2.1	1.6	1.1	1.4

Table 7. Net assimilation rate (g m-^{2} week-^{1})(x10^{-4}) of selected sweet potato clones at various periods of growth.
(a) 2000

Genotype	Days After Planting 66	73	80	87	94
TIS.8441	5.4	6.4	33.9	11.7	16.8
Ex-Igbariam	3.7	21.4	23.7	38.9	16.3
TIS.86/0356	19.8	4.6	15.1	18.6	5.2
TIS.82.0270.OP.1.85	19.5	23.9	23.0	33.3	42.0
TIS.86/0306	3.2	0.7	25.6	68.4	4.9
TIS.2271	7.6	6.2	16.5	2.7	4.5
TIS.2532.OP.1.13	32.9	0.2	5.5	20.8	20.5
CIP 4400168	11.3	2.1	6.2	4.7	6.5
TIS.82/0070.OP.120	2.2	8.0	46.9	7.2	18.8
TIS.8/637	56.9	10.4	19.1	6.9	13.6
NRCRI/UN/13	19.8	12.5	6.3	24.5	59.8
TIS.2544 Rusanya1.5	5.4	16.3	5.6	4.7	20.1
SE±	4.6	2.3	3.7	5.6	4.8

(b) 2001

Genotype	Days After Planting 84	91	98	105	112
TIS.8441	36.8	3.5	21.6	4.6	38.5
Ex-Igbariam	11.4	7.7	8.5	8.7	7.6
TIS.86/0356	10.5	13.6	12.7	9.3	2.9
TIS.86/0306	5.7	0.2	12.3	7.9	5.2
TIS.2271	5.5	8.1	5.2	6.5	6.5
TIS.2532. OP. 1.13	9.6	8.6	4.3	24.0	1.0
CIP4400168	5.3	10.4	0.8	2.7	2.5
TIS.2544 RUSANYA 1.5	6.5	8.9	12.3	12.9	10.2
TIS.87/0087	13.9	19.7	0.3	1.1	19.1
Farmer's Variety	1.0	10.3	5.8	2.9	14.0
SE±	3.1	1.7	2.1	2.1	3.6

Table 8. Harvest index (HI) of selected sweet potato clones at various periods of growth.

(a)2000

Genotype	Days After Planting 59	66	73	80	87	94
TIS.8441	0.05	0.09	0.54	0.62	0.41	0.77
Ex-Igbariam	0.01	0.13	0.52	0.14	0.23	0.20
TIS.86/0356	0.13	0.10	0.43	0.54	0.58	0.63
TIS.82/0270.OP.1.85	0.16	0.57	0.59	0.45	0.79	0.64
TIS.86/0306	0.27	0.56	0.32	0.25	0.55	0.66
TIS.2271	0.06	0.23	0.29	0.43	0.47	0.61
TIS.2532.OP.1.13	0.06	0.10	0.16	0.16	0.51	0.48
CIP4400168	0.03	0.16	0.09	0.17	0.28	0.37
TIS.82/0070.OP.120	0.03	0.17	0.22	0.73	0.37	0.71
TIS.8/637	0.49	0.24	0.24	0.74	0.51	0.29
NRCRI/UN/13	0.01	0.21	0.20	0.38	0.39	0.45
TIS.2544 Rusanya 1.5	0.05	0.21	0.18	0.43	0.50	0.53
SE±	0.04	0.05	0.05	0.06	0.04	0.05

(b) 2001

Genotype	Days After Planting 77	84	91	98	105	112
TIS.8441	0.46	0.79	0.92	0.70	0.57	0.87
Ex-Igbariam	0.17	0.19	0.31	0.71	0.33	0.53
TIS.86/0356	0.19	0.12	0.37	0.44	0.66	0.69
TIS.86/0306	0.22	0.22	0.30	0.39	0.54	0.68
TIS.2271	0.29	0.17	0.51	0.42	0.58	0.55
TIS.2532. OP. 1.13	0.32	0.35	0.58	0.67	0.56	0.68
CIP4400168	0.12	0.12	0.27	0.40	0.16	0.45
TIS.2544 RUSANYA 1.5	0.21	0.13	0.48	0.59	0.67	0.56
TIS.87/0087	0.35	0.59	0.70	0.71	0.68	0.73
Farmer's Variety	0.26	0.42	0.29	0.55	0.75	0.68
SE±	0.03	0.07	0.07	0.04	0.05	0.04

Table 9. Total tuber yield (t/ha) of selected sweet potato clones in 2000 and 2001.

	Total Tuber Yield(t/ha)		
Clone	***2000***	***2001***	***Pooled***
TIS.8441	13.2^{efg}	2.4^{de}	23.5^{b}
Ex-Igbariam	12.6^{fg}	6.2^{bc}	28.3^{ab}
TIS.86/0356	28.9^{a}	7.2^{b}	54.2^{a}
TIS.86/0306	21.1^{bc}	5.7^{bc}	40.2^{ab}
TIS.2271	18.0^{cd}	4.7^{bcd}	34.0^{ab}
TIS.2532.OP.1.13	9.1^{gh}	4.4^{bcd}	20.2^{b}
CIP4400168	13.7^{def}	3.8^{cd}	26.2^{ab}
TIS.2544 Rusanya1.5	13.3^{efg}	0.7^{e}	21.1^{b}
TIS.82/0270.OP.1.85	17.0^{cdef}	na	na
TIS.82/0070.OP.120	17.4^{cde}	na	na
TIS.8/637	22.4^{b}	na	na
NRCRI/UN/13	7.2^{h}	na	na
TIS.87/0087	na	10.1^{a}	na
Farmers' Variety	na	5.8^{bc}	na

Means followed by the same letter(s) within the same column are not significantly different at 5% level of probability (Duncan's new Multiple - Range Test).
na = Not available

Table 10. Correlation of morphological characters with total tuber yield

Parameters	**Correlation Coefficient (r)**
Vine Length	-0.098
Petiole Length	0.138
No. of branches/plant	0.150
Vigour Score	0.447
Leaf Area Index (LAI)	0.044
Leaf Area Duration (LAD)	0.043
Crop Growth Rate (CGR)	0.510
Net Assimilation Rate(NAR)	-0.067
Harvest Index(HI)	0.154

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